

Original Article

# Screening and donor awareness of hepatitis B, hepatitis C, and HIV in Khyber Pakhtunkhwa

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## Abstract

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Globally, blood donations carry the risk of transmitting infectious diseases if not properly screened, necessitating rigorous protocols to detect transfusion-transmitted infections such as hepatitis B virus (HBV), hepatitis C virus (HCV), and HIV. Our study focused on assessing the frequencies of HBV, HCV, and HIV, as well as donor awareness of these infections in Khyber Pakhtunkhwa, Pakistan. This observational study, which was conducted over two months at Nowshera Medical College, involved 100 volunteer blood donors and used a close-ended questionnaire to gather data on both diagnostic results and awareness. The results indicated that HBV was present in 4% of the donors, HCV was present in 2%, and no HIV was detected. Awareness levels varied, with 52% of donors aware of HBV transmission through blood transfusions, 54% recognizing the lack of a vaccine for HCV, and 74% having a greater awareness of HIV affecting the immune system. This study highlights significant gaps in donor knowledge, especially regarding transmission and prevention. These findings underscore the need for enhanced screening and donor education to reduce the risk of infections from blood transfusions. Improved public health strategies and policies are necessary to ensure the safety of the blood supply, ultimately improving health outcomes in the region. This study advocates for targeted interventions that can significantly mitigate transfusion-related risks and foster a safer blood donation environment.

## Keywords

Hepatitis B, screening; Hepatitis C, screening; HIV seroprevalence; Health knowledge, attitudes, practice; Blood donors

## 1. Introduction

Globally, approximately 118.4 million blood donations are collected each year, with 60% originating from low- and middle-income countries (LMICs) [1]. These transfusions, which are essential for saving lives and providing medical care, also carry significant risks of transmitting infectious diseases if not properly screened [2]. Screening protocols are thus crucial and are designed to detect critical transfusion-transmitted infections (TTIs), such as hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis, malaria, and HIV, thereby ensuring the safety of the blood supply from life-threatening diseases prior to its use [3].

Hepatitis, often resulting from viral infections but also from bacteria, toxins, drugs, or alcohol, causes liver inflammation and significant health risks, primarily through

transfusions involving HBV and HCV [4]. Globally, chronic hepatitis C affects approximately 50 million people, resulting in one million new cases and nearly 242,000 deaths annually. Chronic hepatitis B affects approximately 254 million people, leading to 1.2 million new infections and 1.1 million deaths annually [5,6]. Similarly, HIV targets the immune system, increasing susceptibility to various infections and cancers and significantly impacting health systems and economies, especially in high-incidence regions [7]. As of the end of 2022, approximately 39 million people worldwide are living with HIV, as reported by the World Health Organization [7].

In Pakistan, more than 1.5 million units of blood are collected annually, predominantly from replacement and paid donors, who face a greater risk of TTIs [8,9]. The demand for blood is driven by blood disorders such as hemophilia and thalassemia, as well as necessary medical conditions requiring transfusions, including surgeries and hemodialysis [10,11]. Furthermore, the issue is compounded by inadequate screening processes, which result from high testing costs and limited access to modern technology, posing serious public health risks [12].

The global issue of blood safety is particularly acute in Pakistan due to specific systemic vulnerabilities [13]. Our study aimed to determine the frequencies and proportions of HBV, HCV, and HIV among blood donors in Khyber Pakhtunkhwa and to assess their awareness of these infections. By addressing these critical points, we aim to identify where public health interventions could be most effective, enhancing the efficacy of health strategies and ensuring the safety of the blood supply, potentially informing improvements in national health policies and practices.

## 2. Materials and methods

### 2.1. Study design and duration

This observational study was conducted over two months, in November and December 2020.

### 2.2. Ethical approval

The study, derived from a dissertation, received ethical approval from the Ethical Review Committee for Medical and Biomedical Research at the University of Health Sciences. This study adhered to the ethical principles for medical research involving human subjects, as outlined in the Declaration of Helsinki by the World Medical Association [14].

### 2.3. Study participants and setting

The study was conducted at Nowshera Medical College, located in Khyber Pakhtunkhwa (KPK) Province, and individuals who volunteered for blood donations were recruited.

### 2.4. Inclusion and exclusion criteria

Participants included healthy male or female volunteer blood donors aged between 18 and 50 years who had donated blood at least once prior to the study and had no history of infectious diseases transmitted by blood. The study excluded blood donors who did not provide written informed consent, those with a history of drug use, and individuals who had received a blood transfusion within the last six months.

### 2.5. Sample size

The initial sample size of 84 was calculated with the OpenEpi sample size calculator version 3.01, based on a 95% confidence level, a 5% margin of error, and a proportion

estimate of 5.8%. However, the sample size was increased to 100 to enhance the study's power [15,16].

#### 2.6. Study instrument and data collection

The data were collected using a close-ended questionnaire administered by the principal investigator. The questionnaire was structured in two parts: the first part recorded diagnostic results for HBV, HCV, and HIV, and the second part was administered after blood donation and assessed the donors' awareness of these infections. The awareness questions covered basic knowledge about each disease, including transmission methods, prevention strategies, and availability of vaccines, specifically focusing on understanding whether donors were aware of the risks associated with blood transfusions for transmitting HBV, HCV, and HIV [17,18,19].

#### 2.7. Data analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows, version 25.0. Frequencies and percentages were calculated for all variables to achieve the study's objectives, providing quantitative insights into the diagnostic results and awareness levels among the blood donors.

### 3. Results

In a study of 100 blood donors, hepatitis B was detected in four donors, representing a 4.00% infection rate, while hepatitis C was detected in two donors, corresponding to a 2.00% infection rate. HIV was not detected in any of the donors.

Table 1 shows the awareness of blood donors regarding HBV, HCV, and HIV infections. Of the 100 participants, 52% of the donors understood that HBV can be transmitted through blood transfusions, 54% were aware that a vaccine is available for hepatitis B, 54% recognized that HCV can be passed through blood transfusions, and 55% accurately noted that there is no vaccine available for hepatitis C. For HIV, 74% of participants recognized that HIV affects the immune system, and 79% knew how to protect themselves from contracting HIV.

**Table 1.** Awareness among blood donors regarding HBV, HCV, and HIV infections (n = 100).

Infections	Correct Answers	Frequency (%)
<i>HBV</i>		
What is Hepatitis B?	A liver infection	47 (47.00)
Can you get Hepatitis B from a blood transfusion?	Yes	52 (52.00)
What is one way to prevent getting Hepatitis B?	Getting vaccinated	43 (43.00)
Does Hepatitis B have a vaccine?	Yes	54 (54.00)
<i>HCV</i>		
What does Hepatitis C primarily affect in your body?	The liver	49 (49.00)
Can Hepatitis C be passed to someone else through blood transfusion?	Yes	54 (54.00)
Is there a vaccine for Hepatitis C?	No	55 (55.00)
<i>HIV</i>		
What part of the body does HIV affect?	Immune system	74 (74.00)
Can you get HIV from blood transfusions?	Yes	67 (67.00)
How can you protect yourself from getting HIV?	Yes	79 (79.00)
Can HIV be cured entirely?	No	76 (76.00)

#### 4. Discussion

This study highlights the ongoing challenges in blood safety and donor awareness within the KPK region of Pakistan, an area emblematic of broader public health issues in LMICs. Although the rates of HBV and HCV detected among donors were relatively low and no HIV was detected, these findings underscore a critical need for enhanced educational interventions and improved screening protocols. The data suggest that a significant portion of blood donors lack comprehensive knowledge about these infections, particularly in terms of transmission and prevention, which could lead to increased risks of TTIs.

Supporting our findings, a study in Ethiopia estimated the transmission risks of viral hepatitis and HIV among blood donors in Hossana, showing a 14.38% prevalence of TTIs, with HBV, HCV, and HIV rates of 9.83%, 2.39%, and 4.31%, respectively. This study highlighted the impact of educational level, family history, and sexual behavior on TTI incidence [20]. Similarly, a retrospective cross-sectional study spanning 2014 to 2019 across fourteen Ethiopian blood banks noted a historical decline in TTIs, emphasizing the importance of rigorous screening and donor demographic considerations [21].

In Pakistan, studies have consistently revealed high TTI rates among blood donors, particularly among replacement donors, underscoring the necessity of strict screening protocols [22,23]. A retrospective study indicated that HCV followed by HIV are the most prevalent TTIs, with increasing coinfections of HCV and syphilis [24]. These findings are alarming and suggest a pressing need for public education on blood donation safety, thorough medical examinations of donors, and updated screening protocols.

Challenges also stem from adherence to the World Health Organization's recommendations for blood safety and transfusion practices in developing countries, which remain a significant hurdle for healthcare professionals aiming to reduce TTI incidence [25,26]. Furthermore, donor awareness is often influenced by educational level, age, misconceptions, and religious beliefs, complicating efforts to improve blood safety [27,28].

The study demonstrated strengths that included rigorous adherence to ethical standards and a focused examination of infection rates and donor awareness in Khyber Pakhtunkhwa. This approach yielded valuable insights into blood safety and public health education in low- and middle-income settings, bolstered by methodological rigor and structured data collection. However, the study's limitations are notable. The modest sample size and brief duration may restrict the broader applicability of the results. Furthermore, the study was limited to a single medical college and relied solely on volunteer donors, potentially omitting perspectives from higher-risk donor groups such as paid or replacement donors. These limitations highlight the necessity for a cautious interpretation of the findings and suggest the need for expanded research to include a more diverse donor population.

#### 5. Conclusions

In conclusion, this study identified critical areas of need in the blood donation system of Khyber Pakhtunkhwa, specifically in enhancing screening processes and donor education to mitigate transfusion-transmitted infections. Although relatively low, the detection rates of HBV and HCV, in addition to the significant gaps in donor awareness, call for improved public health strategies. By strengthening these areas, health authorities can substantially decrease the risks associated with blood transfusions. These findings can serve as a basis for policymakers to develop more effective health strategies and legislative measures, ultimately leading to a safer blood donation environment and better health outcomes.

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**Ethics statement:** The study, derived from a dissertation, received ethical approval from the Ethical Review Committee for Medical and Biomedical Research at the University of Health Sciences.

**Consent to participate:** Written informed consent was obtained from all participants prior to data collection.

**Data availability:** The data supporting this study's findings are available from the corresponding author, Fatima, upon reasonable request.

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**Conflicts of interest:** The authors declare no conflicts of interest.

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